



Electrolyte – Sulphuric acid

FIAMM Energy Technology S.p.A.
Safety Data Sheet according to
REACH Regulation
03/11/2022 - Revision n. 4
Pagina n. 1/20

Safety Data Sheet

According to Annex II to REACH - Regulation 2020/878

SECTION 1. Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product name	30-40 % Sulphuric acid (Sulphuric acid, electrolyte for batteries)
INDEX number	016-020-00-8
EC number	231-639-5
CAS number	7664-93-9
Registration Number	01-2119458838-20-XXXX

1.2. Relevant identified uses of the substance or mixture and uses advised against

Intended use	Professional use Use of sulphuric acid in the maintenance of batteries containing sulphuric acid Use of batteries containing sulphuric acid
Uses advised against	Any use involving the formation of aerosol, vapour release or the risk of splashes to eyes/skin to which workers without protection for the respiratory tracts, eyes or skin are exposed

1.3. Details of the supplier of the safety data sheet

Name	FIAMM Energy Technology S.p.A.
Full address	Viale Europa, 75
District and Country	Montecchio Maggiore (VI) Italy

tel. **+390444709311**

fax **+390444699237**

e-mail address of the competent person responsible for the Safety Data Sheet	sdp@fiamm.com
--	----------------------

1.4. Emergency telephone number

For urgent inquiries refer to	IRELAND: National Poisons Information Centre (NPIC): +353 1 8092166 MALTA: Medicines & poisons info Office 112 Emergency CONTACT (24-Hour-Number):GBK GmbH +49 (0)6132-84463
-------------------------------	---

SECTION 2. Hazards identification

2.1. Classification of the substance or mixture

The product is classified as hazardous pursuant to the provisions set forth in (EC) Regulation 1272/2008 (CLP) (and subsequent amendments and supplements). The product thus requires a safety datasheet that complies with the provisions of (EU) Regulation 2020/878. Any additional information concerning the risks for health and/or the environment are given in sections 11 and 12 of this sheet.

Physical and chemical hazards: the product is not classified for this hazard category.

Health hazards: the product causes severe skin burns and eye damage.

Environmental hazards: the product is not classified for this hazard category.

Hazard classification and indication:

Skin corrosion, category 1A	H314	Causes severe skin burns and eye damage.
Serious eye damage, category 1	H318	Causes serious eye damage.
	Classification note according to Annex VI to the CLP Regulation: B	

2.2. Label elements

Hazard labelling pursuant to EC Regulation 1272/2008 (CLP) and subsequent amendments and supplements.

Hazard pictograms:



Signal words: Danger

Hazard statements:

H314 Causes severe skin burns and eye damage.

Precautionary statements:

P260 Do not breathe vapours.
P264 Wash hands thoroughly after handling.
P280 Wear protective gloves, protective clothing, eye protection, face protection.
P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P303+P361+P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower].
P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P310 IF SWALLOWED: Immediately call a POISON CENTER or a doctor.
P405 Store locked up.
P501 Dispose of contents and container in accordance with local regulation.
 INDEX 016-020-00-8

The supplier must indicate the concentration of solution in percentage on the label. The concentration expressed in percentage is always understood as weight/weight, unless otherwise indicated.

2.3. Other hazards

The substance does not have persistence, bioaccumulation and toxicity (PBT) properties and is not very persistent and very bioaccumulative. (vPvB). The substance does not have endocrine disrupting properties. Advice for humans and the environment. Sulfuric acid has a corrosive effect on human tissues, with the possibility of damage to the respiratory tract, eyes, skin, and intestines. Environmental effects could occur on a local scale due to pH.

SECTION 3. Composition/information on ingredients

3.1. Substances

Identification	Concentration %	Classification (EC) 1272/2008 (CLP)	Specific concentration limits 1272/2008 (CLP)
Sulphuric acid			
CAS 7664-93-9	> 15 - < 100	Skin Corr. 1A H31 Classification note according to Annex VI to the CLP Regulation: B	Skin Corr. 1A H314: C ≥ 15% Skin Irrit. 2 H315: 5% ≤ C < 15% Eye Irrit. 2 H319: 5% ≤ C < 15%
EC 231-639-5			
INDEX 016-020-00-8			
REACH Reg. 01-2119458838-20-XXXX			

The full wording of hazard (H) phrases is given in section 16 of the sheet.

SECTION 4. First aid measures

4.1. Description of first aid measures

EYES: Immediately wash the eyes with plenty of running water for at least 30-60 minutes, lifting the upper and lower eyelids occasionally. Remove contact lenses if it is easy to do. Seek medical attention if irritation increases and persists.

SKIN: Wash affected area of skin with plenty of water for at least 10 minutes thoroughly and remove contaminated clothing and shoes. Consult a physician



Electrolyte – Sulphuric acid

if irritation increases and persists.

INGESTION: Seek medical attention if the victim feels ill. Wash the mouth with plenty of water and give plenty of water to drink. Do not induce vomiting. Evacuate the material from the pharynx. Administer milk and water. Do not give anything orally if she has difficulty breathing or unconsciousness. Seek medical attention if symptoms persist.

INHALATION: Immediately remove victim to fresh air if adverse effects occur (e.g., dizziness, drowsiness or respiratory tract irritation). Administer oxygen. Humidify inhaled gases. Ventilate with ambu. Practice mouth-to-mouth breathing.

4.2. Most important symptoms and effects, both acute and delayed

Acute dose-dependent effects.

Skin: irritation, burn, ulceration

Eyes: irritation, corneal damage

Nose: irritation

First airways: irritation

Lungs: irritation

Digestive system: if ingested retrosternal and epigastric pain, hematemesis

Chronic effects.

Skin: irritation, depigmentation, skin dryness, epilation

Eyes: irritation

Nose: irritation

First airways: irritation

Lungs: irritation

4.3. Indication of any immediate medical attention and special treatment needed

There may be delayed pulmonary edema up to 48 hours. Treat symptomatically. Consult a doctor.

SECTION 5. Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media

Use the following means:

- carbon dioxide
- foaming agents suitable for polar solvents
- chemical powders
- sand or inert (for small fires)

Unsuitable extinguishing media

Water jets.

Water spray.

5.2. Special hazards arising from the substance or mixture

HAZARDS CAUSED BY EXPOSURE IN THE EVENT OF FIRE

Move containers of the substance away from the fire site or cool if possible, since if exposed to heat radiation or directly involved it can give rise to toxic fumes. Avoid breathing the products of combustion (sulfur oxides).

If the substance is involved in fires that require the use of water as an extinguishing agent, move containers away from the affected area, as violent reactions can occur in contact with water.

Firefighting operations must take into account the risk of explosion; therefore, firefighting personnel must act from a protected position. Containers may explode if exposed to fire. The product is nonflammable and does not support combustion. Move away from containers and cool them with water from a protected position. The product reacts with most metals producing explosive hydrogen gas and sulfur oxides. Sulfuric acid readily dissociates in water by composing into hydrated protons and sulfur ions.

5.3. Advice for firefighters

GENERAL INFORMATION

Use jets of water to cool the containers to prevent product decomposition and the development of substances potentially hazardous for health. Always wear full fire prevention gear. Collect extinguishing water to prevent it from draining into the sewer system. Dispose of contaminated water used for extinction and the remains of the fire according to applicable regulations.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE-FIGHTERS

Normal fire fighting clothing i.e. fire kit (BS EN 469), gloves (BS EN 659) and boots (HO specification A29 and A30) in combination with self-contained open circuit positive pressure compressed air breathing apparatus (BS EN 137).

SECTION 6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

FOR NON-EMERGENCY PERSONNEL



Electrolyte – Sulphuric acid

FIAMM Energy Technology S.p.A.
Safety Data Sheet according to
REACH Regulation
03/11/2022 - Revision n. 4
Pagina n. 4/20

Alert personnel responsible coordinating the response to such emergencies. Move away from the area affected by the accident if you are not in possession of the personal protective equipment listed in Section 8.

FOR EMERGENCY RESPONDERS

Evacuate all personnel not suitably equipped to deal with the emergency.

Wear suitable protective clothing and equipment, as set out in Section 8 of the safety data sheet, to prevent any contamination of the skin, eyes and personal clothing. Stop leak if safe to do so.

Do not permit workers to access the area affected by the accident until safe conditions have been restored. Ventilate the areas affected.

6.2. Environmental precautions

Prevent the product from entering sewers, surface water, groundwater.

Do not discharge directly into a water source. In case of accidental spillage or leakage into sewers or waterways, contact local authorities.

6.3. Methods and material for containment and cleaning up

Vacuum the spilled product into suitable container. Assess the compatibility of the container to be used with the product by checking Section 10. Absorb the remaining with inert absorbent material (e.g., vermiculite, Diatomaceous Earth, sand, kieselguhr, zeolites, activated carbon, aluminum/silica gel).

Provide sufficient ventilation of the location affected by the leak. Disposal of the contaminated material should be carried out in accordance with the provisions of Section 13.

Clean the affected area with a large amount of water. Avoid wind dispersal. Residual traces can be blown away. In case you want to neutralize the substance, carefully use sodium carbonate, sodium bicarbonate, sodium hydroxide.

6.4. Reference to other sections

Any information on personal protection and disposal is given in sections 8 and 13.

SECTION 7. Handling and storage

7.1. Precautions for safe handling

Check the integrity of containers before handling.

Handle containers with particular care.

Whenever possible operate above wind.

Avoid:

- contact with skin and eyes

- Inhalation of vapors and fumes.

Handle in a well-ventilated place.

Do not use contact lenses, use protective goggles with side and overhead guards.

Provide emergency showers and eye fountains.

Provide for the use, particularly in emptying or pouring areas, of localized suction systems.

Containers, once emptied, should be transferred without delay to the area identified for their collection pending disposal or reuse.

Never reuse empty containers before they have undergone industrial cleaning or reconditioning.

Ensure that there are no residues of incompatible substances inside the containers before transferring to other containers.

Ensure that the conveying lines are perfectly clean and contain no oxidizing substances before using the substance.

Make sure transport lines and equipment are perfectly dry before using the substance.

Do not eat, drink or smoke in the work and storage areas.

Food and drink should only be consumed at the designated areas after removing contaminated clothing and protective equipment and washing hands. In all cases, wash hands after handling the substance.

7.2. Conditions for safe storage, including any incompatibilities

Store in closed and labeled containers. Containers should also be protected from damage, accidental shock, and dropping.

Store in closed and labeled containers. Containers must also be protected from damage, accidental impacts and falls.

Ventilate the storage area adequately so that any vapors escaping from the containers can be diluted.

Store in a well-ventilated, dry and cool place and protect from direct sunlight.

Minimize through appropriate procedural and plant operations all possible sources of substance leakage.

Protect containers from moisture and water. Container storage rooms must not be affected by the presence of water, steam, condensate transport lines.

Keep away from food, feed or drink.

Store away from incompatible materials such as water, general organic substances, bases, halogenates, combustibles, oxidizers, reducing agents, chlorinated, carbides, fulminates, picrates, powdered metals, mercury nitride, silver peroxychromate, among others, nitro compounds, sodium, potassium, hydrogen peroxide, perchlorates, permanganates, potassium chlorate, bromine pentafluoride, chlorine trifluoride, copper nitride, phosphorus oxide, phosphorus, zinc iodide, zinc and its salts, acetone, acetaldehyde, alcohols.

Store only in the original container.

Do not store in rooms protected by water fire extinguishing system.

Arrangement of storage area should be such that accidental spills cannot percolate into the ground.

Keep containers separate from strong oxidants.

Do not use metal containers unless adequately protected from corrosion.

Store in the original container. Keep container tightly closed in a cool, dry, well-ventilated place. Keep product away from heat (<40°C), direct sunlight, away from incompatible materials (alkalis and oxidizers)



Electrolyte – Sulphuric acid

Suitable packaging materials: plastic containers
Product is stable but may be corrosive to metals
Do not freeze
If metal containers are used, make sure they are protected on the inside against corrosion
Storage class TRGS 510 (Germany): 8A

7.3. Specific end use(s)

No specific end uses are intended other than the relevant uses set out in Section 1.2 of this safety data sheet.

SECTION 8. Exposure controls/personal protection

8.1. Control parameters

Regulatory References:

ITA	Italia	Decreto Legislativo 9 Aprile 2008, n.81
EU	OEL EU	Directive (EU) 2022/431; Directive (EU) 2019/1831; Directive (EU) 2019/130; Directive (EU) 2019/983; Directive (EU) 2017/2398; Directive (EU) 2017/164; Directive 2009/161/EU; Directive 2006/15/EC; Directive 2004/37/EC; Directive 2000/39/EC; Directive 98/24/EC; Directive 91/322/EEC.
	TLV-ACGIH	ACGIH 2022

Sulphuric acid Threshold Limit Value

Type	Country	TWA/8h	STEL/15min	Remarks / Observations	Critical effects
		mg/m ³	ppm		
			mg/m ³		
VLEP	ITA	0,05			Sulphuric acid (nebulization)
OEL	EU	0,05			Sulphuric acid (nebulization)
TLV-ACGIH		0,2		A2	Pulm function

Health - Derived no-effect level - DNEL / DMEL

Route of exposure	Effects on consumers			Effects on workers				
	Acute local	Acute systemic	Chronic local	Chronic systemic	Acute local	Acute systemic	Chronic local	Chronic systemic
Inhalation					0,1 mg/m ³		0,05 mg/m ³	

Legend:
(C) = CEILING; INHAL = Inhalable Fraction; RESP = Respirable Fraction; THORA = Thoracic Fraction; VND = hazard identified but no DNEL/PNEC available; NEA = no exposure expected; NPI = no hazard identified; LOW = low hazard; MED = medium hazard; HIGH = high hazard.

8.2. Exposure controls

As the use of adequate technical equipment must always take priority over personal protective equipment, make sure that the workplace is well aired through effective local aspiration.
When choosing personal protective equipment, ask your chemical substance supplier for advice.
Personal protective equipment must be CE marked, showing that it complies with applicable standards.

HAND PROTECTION

Protect hands with category III gloves, which protects against inorganic mineral acid (class L). Recommended material: fluorinated rubber, butyl rubber (ref. standard EN 374). The following should be considered when choosing work glove material: compatibility, degradation, failure time and permeability. The work gloves' resistance to chemical agents should be checked before use, as it can be unpredictable. The gloves' wear time depends on the duration and type of use.

SKIN PROTECTION

Wear category III professional long-sleeved overalls and safety footwear (see Regulation 2016/425 and standard EN ISO 20344). Wash body with soap and water after removing protective clothing.

EYE PROTECTION

Hooded visor or protective visor combined with airtight goggles recommended (see standard EN 166). Provide an emergency shower with face and eye

wash station.

RESPIRATORY PROTECTION

If the threshold value (e.g., TLV-TWA) of the substance is exceeded, it is recommended to wear a mask with a type B filter, the class (1,2 or 3) of which should be chosen in relation to the limit concentration of use (ref. standard EN 14387). If gases or vapours of a different nature and/or gases or vapours with particles (aerosols, fumes, mists, etc.) are present, combined type filters should be provided.

The use of respiratory protective means is necessary in case the technical measures taken are not sufficient to limit the worker's exposure to the threshold values taken into consideration. However, the protection offered by masks is limited.

In case the substance under consideration is odourless or its odour threshold is higher than the relevant TLV-TWA and in case of emergency, wear an open-circuit self-contained compressed-air breathing apparatus (ref. standard EN 137) or an air-supplied respirator (ref. standard EN 138). Refer to EN 529 for the correct choice of respiratory protective equipment.

ENVIRONMENTAL EXPOSURE CONTROLS

The emissions generated by manufacturing processes, including those generated by ventilation equipment, should be checked to ensure compliance with environmental standards.

Do not discharge into open water or sanitary sewer systems.

Air: knock down gas, fumes and/or dust with water.

Soil: avoid penetration into subsoil.

Water: do not allow product to enter drains.

SECTION 9. Physical and chemical properties

9.1. Information on basic physical and chemical properties

Properties	Value	Information
Appearance	Liquid	
Colour	Colorless if no impurities are present - to dark brown	
Odour	Odourless	
Melting point / freezing point	Variable according to concentration (from -37°C at 65% to +11°C at 100%)	
Initial boiling point	Variable as a function of concentration (from 106°C at 25% to 315°C at 98%)	
Flammability	Non-flammable (depending on molecular structure)	
Lower explosive limit	not available	
Upper explosive limit	not available	
Flash point	not available	
Auto-ignition temperature	not available	
Decomposition temperature	340 °C	
pH	< 0,3	
Kinematic viscosity	21 mPa*s	HSDB, 2015 Temperature: 25 °C
Dynamic viscosity	ca. 22,5 mPa.s a ca. 20 °C (conc. 95%)	
Solubility	completely miscible	Temperature: 20 °C
Partition coefficient: n-octanol/water	1,92	
Vapour pressure	Variable as a function of concentration (from 214 Pa at 65% to 6 Pa at 90%-at 20°C)	
Density and/or relative density	>1835 kg/m ³ (20 °C) (100% conc.)	
Relative vapour density	not available	
Particle characteristics	not applicable	The product is liquid

9.2. Other information



Electrolyte – Sulphuric acid

FIAMM Energy Technology S.p.A.
Safety Data Sheet according to
REACH Regulation
03/11/2022 - Revision n. 4
Pagina n. 7/20

9.2.1. Information with regard to physical hazard classes
Information not available

9.2.2. Other safety characteristics
Dissociation constant: c.a. 1,9 pKa

SECTION 10. Stability and reactivity

10.1. Reactivity

The substance is strongly oxidizing, dehydrating and sulfonizing most organic compounds.

It attacks and corrodes many metals with the development of hydrogen; the corrosivity of sulfuric acid toward metals depends on its concentration and temperature. Dilute acid dissolves aluminum, chromium, cobalt, copper, zinc, iron, manganese and nickel but does not dissolve lead and mercury (INRS, 2010).

10.2. Chemical stability

Strongly hygroscopic liquid. At 340 °C it decomposes to sulfur trioxide and water.

Stable under recommended conditions for storage and handling, reacts with strong oxidizing agents and alkaline substances (bases).

10.3. Possibility of hazardous reactions

The product reacts with metals with development of highly flammable hydrogen. Acid reacts violently with alkali with development of heat, the same when water is added.

Dilution of the substance in water is highly exothermic and fast.

If water is poured over the concentrated acid, the reaction is violent and accompanied by liquid projections (INRS, 2010).

It reacts violently with, for example: carbides, perchlorates, permanganates, fulminates, nitrates, picrates, acrylonitrile, propargyl alcohol.

These reactions can be explosive (INRS, 2010).

10.4. Conditions to avoid

Heating.

Air exposure.

Any use involving aerosol formation or vapor release greater than 0.05 mg/m³ where workers are exposed, without using adequate respiratory protection.

Any use with splash hazard to the eyes/skin where workers are exposed, without using adequate eye/skin protection.

10.5. Incompatible materials

Metals, fuels, alkalis, chlorates, hydrochloric acid.

10.6. Hazardous decomposition products

Burning, it develops sulfur oxides.

When heated, it emits highly toxic fumes.

SECTION 11. Toxicological information

11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

Sulfuric acid is a strong, highly corrosive acid. The substance causes only local and not systemic effects. Sulfuric acid rapidly dissociates almost completely on contact with water, releasing the sulfur ion and the hydrogen ion, which combines with water to form a hydrogenion. Both ions (sulfur and hydrogenion) are normally present in the human body.

Metabolism, toxicokinetics, mechanism of action and other information

In inhalation exposure, the effects depend on aerosol particle size (which determines the site of deposition in the respiratory tract), ambient and respiratory tract humidity (which determines particle size), respiratory frequency, and the buffering capacity of the airways as well as their architecture (INRS, 2010). In the human respiratory system, ammonia produced can partially neutralize aerosol acidity and modify mucus secretion. The mode in respiration influences the deposition of particles. Whatever the particle size, under mouth breathing, the dose deposited is greatest in the oropharynx, larynx and upper trachea (INRS, 2010).

Sulfuric acid rapidly dissociates into hydrogen ions and sulfate ions. The latter are incorporated into the body's electrolyte pool; the excess is eliminated with urine. Toxic effects are due to the hydrogen ion locally changing the pH (INRS, 2010).

The clearance of sulfuric acid [35S] was studied in rats and guinea pigs and dogs exposed nasally (1 to 20 mg/m³; median aerodynamic mass diameter (MMAD) 0.4-1.2 µm) for 30 seconds or by intranasal instillation in rats and guinea pigs. The results indicate that sulfur is rapidly eliminated from the lungs (half-life 170, 230, 261 seconds in rats, guinea pigs and dogs, respectively). After intranasal instillation, little sulfur is absorbed; 5 min after treatment, 97.1 and 96.9% of the dose remains in the nose in rats and guinea pigs, respectively. Oral or dermal absorption has not been studied (INRS, 2010).

Information on likely routes of exposure

The main potential routes of exposure are inhalation, skin contact and ingestion.



Electrolyte – Sulphuric acid

FIAMM Energy Technology S.p.A.
Safety Data Sheet according to
REACH Regulation
03/11/2022 - Revision n. 4
Pagina n. 8/20

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Exposure to substance vapors or aerosols results in symptoms of eye, skin and respiratory tract irritation. Severity is a function of concentration, duration of exposure, inhaled particle size and ambient humidity.

In moderate severity cases, there is nasal, eye, and throat irritation, painful chest oppression, coughing, and difficulty breathing. Main complication is delayed pulmonary edema, which can occur within 48 hours of exposure and can be triggered or aggravated by physical exertion. Infectious complications are frequent.

In the case of massive exposures there can be: bronchospasm, laryngeal edema, and acute respiratory failure that can rapidly progress to shock with death from cardio-respiratory failure.

Sequelae are chronic respiratory failure that follows severe intoxication and in relation to injuries such as: bronchiolitis obliterans, emphysema or fibrosis. Another complication may be hyposmia or anosmia associated with chronic rhinitis.

Ingestion of a concentrated solution causes severe caustic injury of the digestive tract. There is oro-pharyngeal, retro-sternal, and epigastric pain, dysphagia, hypersialorrhea, and often bloody vomiting. This symptomatology may be associated with respiratory symptoms due to laryngeal edema or inhalation pneumopathy. Tissue necrosis involves hydroelectrolyte disturbances, metabolic acidosis, hyperleukocytosis, hemolysis, increased tissue enzymes, and sometimes a consummatory coagulopathy.

In the first week, possible complications are: a digestive perforation, digestive hemorrhage, shock state, and infectious complications. The main long-term complications are cancerization of scar lesions (INRS, 2014).

Repeated or prolonged skin contact can cause dermatitis (IPCS, 2015).

Repeated or prolonged exposures can cause lung effects (IPCS, 2015).

Risk of dental erosion with repeated or prolonged exposure to an aerosol of this substance (IPCS, 2015).

Interactive effects

Information not available

ACUTE TOXICITY

On the basis of available data and in view of the classification criteria of Annex I, Part 3 of (EC) Reg. 1272/2008 as amended, the substance is not classified for this hazard class.

LD50 (Oral):	2140 mg/kg bw Rat (INRS, 2010; OECD, 2001)
LC50 (Inhalation mists/powders):	375 mg/m ³ /4h Rat (INRS, 2010).

SKIN CORROSION / IRRITATION

On the basis of available data and in view of the classification criteria set forth in table 3.2.3 of Annex I of (EC) Reg. 1272/2008 as amended, the substance is classified as **Skin Corr. 1A, H314**.

In humans, direct skin contact with a concentrated sulfuric acid solution (pH < 2) results in caustic lesions that are all the more severe the longer the contact time has been prolonged and the concentration is high. Clinically, there is erythema, pain and localized edema followed by flitene, areas of necrosis and ulcers if decontamination is not promptly carried out. The lesions can become infected and scarring and functional sequelae can remain (INRS, 2010). A 10% solution induces skin erosion, 5% erythema and edema, and 2.5% has no effect on rat and mouse; no effect was observed on the skin of guinea pigs and rabbits exposed to a 10% solution for 4 hours (INRS, 2010).

Respiratory Corrosion. The concentrated substance, at relevant doses, has caustic power.

SERIOUS EYE DAMAGE / IRRITATION

On the basis of available data and in view of the classification criteria set forth in table 3.3.3 of Annex I of (EC) Reg. 1272/2008 as amended, the substance is classified as **Eye Dam. 1, H318**.

In the eye, the substance causes burns that are clinically manifested by immediate pain, tearing, conjunctival hyperemia, local edema, and blepharospasm. The substance, in contrast to strong bases that spread rapidly in depth, causes rapid necrosis of superficial tissues, which limits penetration into deep tissues. With prolonged contact with highly concentrated solutions, lesions affect the iris and lens. Possible complications are cataracts, glaucoma, corneal opacities, scarring lesions of the eyelids and even blindness (INRS, 2010).

Solutions of 1-1.25 percent sulfuric acid have no effect on rabbit eye (INRS, 2010).

RESPIRATORY OR SKIN SENSITISATION

On the basis of available data and in view of the classification criteria of Annex I, Part 3 of (EC) Reg. 1272/2008 as amended, the substance is not classified for this hazard class.

Respiratory sensitization

Inhalation of substance can cause Brooks syndrome (irritant-induced asthma) in humans (INRS, 2014).

Skin sensitization

No literature data are available on skin sensitization in either humans or animals (INRS, 2014).

GERM CELL MUTAGENICITY



Electrolyte – Sulphuric acid

FIAMM Energy Technology S.p.A.
Safety Data Sheet according to
REACH Regulation
03/11/2022 - Revision n. 4
Pagina n. 9/20

On the basis of available data and in view of the classification criteria of Annex I, Part 3 of (EC) Reg. 1272/2008 as amended, the substance is not classified for this hazard class.

In vitro gave negative results in the Ames assay both in the presence and absence of metabolic activation.

The positive responses reported in other in vitro assays (chromosomal aberrations in Chinese hamster ovary cells both in the presence and absence of metabolic activation), are considered to be a consequence of lowering pH (3.5 to 7) after sulfuric acid treatment (INRS, 2014).

In vivo studies are not available (INRS, 2014).

CARCINOGENICITY

On the basis of available data and in view of the classification criteria of Annex I, Part 3 of (EC) Reg. 1272/2008 as amended, the substance is not classified for this hazard class.

In a recent evaluation, data showed association between exposure to strong inorganic acid mists and laryngeal cancer in humans while limited to state a causal association with bronchial cancer. A positive association between exposure to strong inorganic acid mists and lung cancer has also been observed in humans (IARC, 2012).

No animal studies are available in the literature.

- The International Agency for Research on Cancer (IARC) allocates strong inorganic acid mists in Group 1 (established human carcinogen), based on evidence of sufficient carcinogenicity in humans (cancer of the larynx and positive association between exposure to strong inorganic acid mists and lung cancer) (IARC, 2012).

The US National Toxicology Program (NTP) lists strong inorganic acid mists containing sulfuric acid in the Thirteenth Report on Carcinogens by allocating them to the category of recognized human carcinogens. (US DHHS, 2014).

REPRODUCTIVE TOXICITY

On the basis of available data and in view of the classification criteria of Annex I, Part 3 of (EC) Reg. 1272/2008 as amended, the substance is not classified for this hazard class.

Adverse effects on sexual function and fertility

No reproductive toxicity data are available in either humans or animals (INRS, 2014; EC, 2007).

Adverse effects on development of the offspring

The substance, in light of current knowledge, does not appear to be embryo- or fetotoxic (INRS, 2014).

No significant effect on the number of implants or resorptions was observed in mice exposed from day 6 to day 15 of gestation, or in rabbits exposed from day 6 to day 18 of gestation at 5 and 20 mg/m³, 7 hours/day. The high concentration induced decreased maternal weight and increased rhinitis and tracheitis while, these concentrations induced no effect in embryos and fetuses of mice; in rabbits, increased incidence of small non-ossified areas was observed in the skull (INRS, 2014).

Effects on or via lactation

Information not available

STOT - SINGLE EXPOSURE

On the basis of available data and in view of the classification criteria of Annex I, Part 3 of (EC) Reg. 1272/2008 as amended, the substance is not classified for this hazard class.

Exposure to sulfuric aerosol is responsible for respiratory tract irritation with an intensity that depends on the atmospheric concentration of acid, the characteristics of the aerosol, the duration of exposure, and the sensitivity of the exposed animal.

In animals, oral administration of sulfuric acid causes severe caustic lesions of the digestive tract when the pH of the solution is below 1.5 (INRS, 2014).

STOT - REPEATED EXPOSURE

On the basis of available data and in view of the classification criteria of Annex I, Part 3 of (EC) Reg. 1272/2008 as amended, the substance is not classified for this hazard class.

Long-term exposures to weak concentrations of sulfuric acid cause dental erosions (INRS, 2014).

Repeated contacts to weak concentrations of substance solutions can cause contact dermatitis (INRS, 2014).

Signs of nasal irritation (metaplasia, dysplasia, atypia of the nasal mucosa) and chronic bronchitis are reported in exposed workers.

In animals, repeated exposure to sulfuric acid shows great variability in response depending on the species and effect studied. However, the toxic effects are, in all cases, caused by local irritation; there is no systemic effect (INRS, 2014).

ASPIRATION HAZARD

On the basis of available data and in view of the classification criteria of Annex I, Part 3 of (EC) Reg. 1272/2008 as amended, the substance is not classified for this hazard class

Ingestion of a concentrated solution can cause in addition to severe caustic injuries inhalation pneumonia (INRS, 2014).



Electrolyte – Sulphuric acid

FIAMM Energy Technology S.p.A.
Safety Data Sheet according to
REACH Regulation
03/11/2022 - Revision n. 4
Pagina n. 10/20

11.2. Information on other hazards

Based on the available data, the substance is not listed in the main European lists of potential or suspected endocrine disruptors with human health effects under evaluation.

SECTION 12. Ecological information

Use this product according to good working practices. Avoid littering. Inform the competent authorities, should the product reach waterways or contaminate soil or vegetation.

In base alla valutazione della classificazione dei componenti e delle disposizioni di classificazione di cui all'allegato I, parte 4, del regolamento (CE) n. 1272/2008 e successive modifiche, la sostanza non è classificata come pericolosa per l'ambiente.

It is well established that the aquatic toxicity of sulfuric acid occurs if sufficient acid is present to produce a very low pH (i.e., pH 3-5). Since the environmental exposure assessment shows insignificant changes in aquatic pH levels depending on the formulation of the product and its proposed use, it is considered that there is no long-term risk to aquatic organisms and, therefore, no data on chronic fish effects are required.

12.1. Toxicity

Sulphuric acid

LC50 - for Fish	16 mg/l/96h > 16 - < 28, <i>Lepomis macrochirus</i>
EC50 - for Crustacea	> 100 mg/l/48h <i>Daphnia Magna</i>
EC50 - for Algae / Aquatic Plants	> 100 mg/l/72h <i>Desmodesmus subspicatus</i>
Chronic NOEC for Fish	0,025 mg/l <i>Jordanella floridae</i> . 65 d
Chronic NOEC for Crustacea	0,15 mg/l

Short-term effects.

Fish (*Lepomis macrochirus*) LC50-96 hr: 16-28 mg/l (pH 3.25-3.5);

Fish (*Brachydanio rerio*) LC50-24 hr: 82 mg/l (ISO method 7346/1);

Crustaceans LC50-48 hr: 29 mg/l (ISO method 6341) (HSDB 2015).

Hazardous to terrestrial plants.

Long-term effects.

Fish (*Salvelinus fontinalis*) NOEC: 0.31 mg/l (pH 5.2) (effect on embryonic survival), NOEC: 0.15 mg/l (pH 5.5) (effect on hatching time); NOEC: 0.13 mg/l (pH 5.56 mg/l) (effect on weight of young fish);

Fish (*Jordanella floridae*) NOEC: 0.025 mg/l (value calculated by LOEC);

Crustaceans (*Tanytarsus dissimilis*) NOEC-35 days: 0.15 mg/l (pH 5.5) (effect on reproduction) (HSDB, 2015).

12.2. Persistence and degradability

Sulphuric acid

Rapidly degradable

In air, liquid sulfuric acid can exist as vapor or mist; however, it exists mainly as mist because of its low volatility and high affinity for water (US DHHS, 2014).

Sulfates, including sulfuric acid, are removed from the atmosphere through wet and dry depositions.

In the stratosphere, sulfuric acid aerosol has a half-life of about 14 and 2.4 days at an altitude of 15 and 20 km, respectively (ATSDR, 1998).

In water, sulfuric acid dissociates rapidly to sulfate ions and proton hydrates (at pH 3.92 for example, dissociation is 99%) (OECD SIDS 2001).

Under the action of heat, it decomposes to sulfur dioxide and water.

In soil, anaerobic bacteria can reduce sulfate to sulfide (ATSDR, 1998).

12.3. Bioaccumulative potential

Sulfuric acid does not bioaccumulate in tissues as it is completely dissociated in water (OECD SIDS 2001).

12.4. Mobility in soil

High ground mobility is expected.

On the ground it percolates, dissolving some substances including basic carbonates.

12.5. Results of PBT and vPvB assessment

The substance does not have persistence, bioaccumulation and toxicity (PBT) properties and is not very persistent and very bioaccumulative. (vPvB).

12.6. Endocrine disrupting properties

Based on the available data, the substance is not listed in the main European lists of potential or suspected endocrine disruptors with environmental effects under evaluation.

12.7. Other adverse effects

Information not available

SECTION 13. Disposal considerations**13.1. Waste treatment methods**

Reuse, when possible. Product residues should be considered special hazardous waste. The hazard level of waste containing this product should be evaluated according to applicable regulations.

Disposal must be performed through an authorised waste management firm, in compliance with national and local regulations.

Waste transportation may be subject to ADR restrictions.

CONTAMINATED PACKAGING

Contaminated packaging must be recovered or disposed of in compliance with national waste management regulations.

SECTION 14. Transport information**14.1. UN number or ID number**

ADR / RID, IMDG, IATA: 2796

14.2. UN proper shipping name

ADR / RID: SULPHURIC ACID or BATTERY FLUID, ACID
IMDG: SULPHURIC ACID or BATTERY FLUID, ACID
IATA: SULPHURIC ACID or BATTERY FLUID, ACID

14.3. Transport hazard class(es)

ADR / RID: Class: 8 Label: 8

IMDG: Class: 8 Label: 8

IATA: Class: 8 Label: 8

**14.4. Packing group**

ADR / RID, IMDG, IATA: II

14.5. Environmental hazards

ADR / RID: NO
IMDG: NO
IATA: NO

14.6. Special precautions for user

ADR / RID:	HIN - Kemler: 80 Special provision: -	Limited Quantities: 1 L	Tunnel restriction code: (E)
IMDG:	EMS: F-A, S-B	Limited Quantities: 1 L	
IATA:	Cargo: Pass.:	Maximum quantity: 30 L Maximum quantity: 1 L	Packaging instructions: 855 Packaging instructions: 851
	Special provision:	-	

14.7. Maritime transport in bulk according to IMO instruments

Information not relevant



Electrolyte – Sulphuric acid

FIAMM Energy Technology S.p.A.
Safety Data Sheet according to
REACH Regulation
03/11/2022 - Revision n. 4
Pagina n. 12/20

SECTION 15. Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Seveso Category - Directive 2012/18/EU: None

Restrictions relating to the product or contained substances pursuant to Annex XVII to EC Regulation 1907/2006

Point	3 - 75	Sulphuric acid
-------	--------	----------------

Regulation (EU) 2019/1148 - on the marketing and use of explosives precursors

Restricted explosives precursor

The acquisition, introduction, possession or use of that restricted explosives precursor by members of the general public is subject to a restriction as set out in Article 5(1) and (3). Restricted explosives precursors shall not be made available to, or introduced, possessed or used by members of the general public.

The acquisition, introduction, possession or use of that regulated explosives precursor by members of the general public is subject to reporting obligations as set out in Article 9.

All suspicious transactions and significant disappearances and thefts must be reported to the relevant national contact point.

Substances in Candidate List (Art. 59 REACH): On the basis of available data, the product does not contain any SVHC in percentage \geq than 0,1%.

Substances subject to authorisation (Annex XIV REACH): None

Substances subject to exportation reporting pursuant to Regulation (EU) 649/2012: None

Substances subject to the Rotterdam Convention: None

Substances subject to the Stockholm Convention: None

Biocidal Products Regulation (Reg. (EU) 528/2012): not applicable

Detergent regulations (Reg. (EC) 648/2004): not applicable

Dir. 2004/42/EC - VOC/Italian Leg. Decr. 161/2006: not applicable

Healthcare controls: Workers exposed to this chemical agent must not undergo health checks, provided that available risk-assessment data prove that the risks related to the workers' health and safety are modest and that the 98/24/EC directive is respected.

German regulation on the classification of substances hazardous to water (AwSV, vom 18. April 2017)

WGK 1: Low hazard to waters

Substance listed in Annex 2

15.2. Chemical safety assessment

A chemical safety assessment has been performed for the substance.

SECTION 16. Other information

Revision 4 changes: adaptation to the Regulation (EU) 2020/878

Text of hazard (H) indications mentioned in section 2-3 of the sheet:

Skin Corr. 1A	Skin corrosion, category 1A
Eye Dam. 1	Serious eye damage, category 1
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.

LEGEND:

- ADR: European Agreement concerning the carriage of Dangerous goods by Road
- ATE: Acute Toxicity Estimate
- CAS: Chemical Abstract Service Number
- CE50: Effective concentration (required to induce a 50% effect)

- CE: Identifier in ESIS (European archive of existing substances)
 - CLP: Regulation (EC) 1272/2008
 - DNEL: Derived No Effect Level
 - EmS: Emergency Schedule
 - GHS: Globally Harmonized System of classification and labeling of chemicals
 - IATA DGR: International Air Transport Association Dangerous Goods Regulation
 - IC50: Immobilization Concentration 50%
 - IMDG: International Maritime Code for dangerous goods
 - IMO: International Maritime Organization
 - INDEX: Identifier in Annex VI of CLP
 - LC50: Lethal Concentration 50%
 - LD50: Lethal dose 50%
 - OEL: Occupational Exposure Level
 - PBT: Persistent bioaccumulative and toxic as REACH Regulation
 - PEC: Predicted environmental Concentration
 - PEL: Predicted exposure level
 - PNEC: Predicted no effect concentration
 - REACH: Regulation (EC) 1907/2006
 - RID: Regulation concerning the international transport of dangerous goods by train
 - TLV: Threshold Limit Value
 - TLV CEILING: Concentration that should not be exceeded during any time of occupational exposure.
 - TWA: Time-weighted average exposure limit
 - TWA STEL: Short-term exposure limit
 - VOC: Volatile organic Compounds
 - vPvB: Very Persistent and very Bioaccumulative as for REACH Regulation
 - WGK: Water hazard classes (German).
-
- A1 = Confirmed Human Carcinogen
 - A2 = Suspected Human Carcinogen
 - A3 = Confirmed Animal Carcinogen with Unknown Relevance to Humans
 - A4 = Not Classifiable as a Human Carcinogen
 - A5 = Not Suspected as a Human Carcinogen
 - IBE = Biological Indicators of Exposure.

Note B:

Some substances (acids, bases, etc.) are placed on the market in aqueous solutions at various concentrations and, therefore, these solutions require different classification and labelling since the hazards vary at different concentrations. In Part 3 entries with Note B have a general designation of the following type: 'nitric acid ... %'. In this case the supplier must state the percentage concentration of the solution on the label. Unless otherwise stated, it is assumed that the percentage concentration is calculated on a weight/weight basis.

CALCULATION METHODS

Chemical-physical hazards: the dangerousness has been derived from the classification criteria of CLP Regulation Annex I Part 2 as amended and added. Health hazards have been assessed with the calculation method set out by Reg. (EC) 1272/2008 (CLP) as amended and added for the classification of mixtures when data are available on all components of the mixture or some of them:

Acute Tox: application of criteria in Table 3.1.1. Annex I Part 3 of CLP Regulation as amended and added.

Skin Corr. 1A/1B/1C H314: application of additivity formula criteria in Table 3.2.3 Annex I Part 3 of CLP Regulation

Skin Irrit. 2 H315: application of additivity formula criteria in Table 3.2.3 Annex I Part 3 of CLP Regulation

Eye Dam 1 H318: application of additivity formula criteria in Table 3.3.3 Annex I Part 3 of CLP Regulation

Eye Irrit. 2 H319: application of the additivity formula criteria in Table 3.3.3 Annex I Part 3 of CLP Regulation

Eye Irrit. 2 H319: table 3.3.3 of Annex I, Part 3 of Reg. (EC) 1272/2008 (CLP) as amended and added.

Skin Sens 1A/1B/1 H317 Table 3.4.5 of Annex I, Part 3 of Reg. (EC) 1272/2008 (CLP) as amended and added.

Resp Sens 1A/1B/1 H334 Table 3.4.5 of Annex I, Part 3 of Reg. (EC) 1272/2008 (CLP) as amended and added.

Muta. 1A/1B, 2 H340 - H341: table 3.5.2 Annex I Part 3 of CLP Regulation as amended and added.

Carc 1A/1B, 2 H350 - H351: table 3.6.2 Annex I Part 3 of CLP Regulation as amended and added.

Repr 1A/1B, 2 H360 - H361: table 3.7.2 Annex I Part 3 of CLP Regulation as amended and added.

STOT SE 1, 2 H370 - 371: application of the calculation methods - table 3.8.3 of Ann. I, Part 3 of Reg. (EC) 1272/2008 (CLP) as amended and added.

STOT SE 3 H336: ch. 3.8.3.4.5 of Annex I, Part 3 of Reg. (EC) 1272/2008 (CLP) as amended and added.

STOT RE 1, 2 H372 - H373: table 3.9.4 Annex I Part 3 of CLP Regulation as amended and added.

Asp Tox 1 H304: application of criteria 3.10 Annex I Part 3 of CLP Regulation as amended and added

Environmental hazards have been assessed with the calculation method set out by Reg. (EC) 1272/2008 (CLP) as amended and added for the classification of mixtures when data are available on all components of the mixture or some of them:

toxicity for the aquatic environment acute effects: table 4.1.1 of Annex I, Part 4 of Reg. (EC) 1272/2008 (CLP) as amended and added;

toxicity for the aquatic environment chronic effects: table 4.1.2 of Annex I, Part 4 of Reg. (EC) 1272/2008 (CLP) as amended and added.

GENERAL BIBLIOGRAPHY

1. Regulation (EC) 1907/2006 (REACH) of the European Parliament
2. Regulation (EC) 1272/2008 (CLP) of the European Parliament
3. Regulation (EU) 2020/878 (II Annex of REACH Regulation)



Electrolyte – Sulphuric acid

FIAMM Energy Technology S.p.A.
Safety Data Sheet according to
REACH Regulation
03/11/2022 - Revision n. 4
Pagina n. 14/20

4. Regulation (EC) 790/2009 (I Atp. CLP) of the European Parliament
 5. Regulation (EU) 286/2011 (II Atp. CLP) of the European Parliament
 6. Regulation (EU) 618/2012 (III Atp. CLP) of the European Parliament
 7. Regulation (EU) 487/2013 (IV Atp. CLP) of the European Parliament
 8. Regulation (EU) 944/2013 (V Atp. CLP) of the European Parliament
 9. Regulation (EU) 605/2014 (VI Atp. CLP) of the European Parliament
 10. Regulation (EU) 2015/1221 (VII Atp. CLP) of the European Parliament
 11. Regulation (EU) 2016/918 (VIII Atp. CLP) of the European Parliament
 12. Regulation (EU) 2016/1179 (IX Atp. CLP)
 13. Regulation (EU) 2017/776 (X Atp. CLP)
 14. Regulation (EU) 2018/669 (XI Atp. CLP)
 15. Regulation (EU) 2019/521 (XII Atp. CLP)
 16. Delegated Regulation (UE) 2018/1480 (XIII Atp. CLP)
 17. Regulation (EU) 2019/1148
 18. Delegated Regulation (UE) 2020/217 (XIV Atp. CLP)
 19. Delegated Regulation (UE) 2020/1182 (XV Atp. CLP)
 20. Delegated Regulation (UE) 2021/643 (XVI Atp. CLP)
 21. Delegated Regulation (UE) 2021/849 (XVII Atp. CLP)
- The Merck Index. - 10th Edition
 - Handling Chemical Safety
 - INRS - Fiche Toxicologique (toxicological sheet)
 - Patty - Industrial Hygiene and Toxicology
 - N.I. Sax - Dangerous properties of Industrial Materials-7, 1989 Edition
 - IFA GESTIS website
 - ECHA website
 - Database of SDS models for chemicals - Ministry of Health and ISS (Istituto Superiore di Sanità) - Italy

Note for users:

The information contained in the present sheet are based on our own knowledge on the date of the last version. Users must verify the suitability and thoroughness of provided information according to each specific use of the product.

This document must not be regarded as a guarantee on any specific product property.

The use of this product is not subject to our direct control; therefore, users must, under their own responsibility, comply with the current health and safety laws and regulations. The producer is relieved from any liability arising from improper uses.

Provide appointed staff with adequate training on how to use chemical products.

Sections revised from previous version: ALL.

ANNEXED EXPOSURE SCENARIOS (2)

Exposure scenario	Sector of Use	Process Categories	Product Categories	Environmental release category ERC
Use of sulphuric acid in the maintenance of batteries containing sulphuric acid	3	2,4,5,8a	0 - UCN Code E10100 (electrolytes)	1
Use of batteries containing sulphuric acid	21	PROC 19	0 - UCN Code E10100 (electrolytes)	9b

1 Exposure scenario (1 of 2)	
Use of sulphuric acid in the maintenance of batteries containing sulphuric acid	
Usage descriptors related to the life cycle phase	SU22 Professional uses: public sector (administration, education, entertainment, services, light industry) PC 0 UCN Code E10100 (Electrolytes) PROC 19 ERC8b; ERC9b
Description of the environmental scenario (1) and category of release in the corresponding environment (ERC)	<ol style="list-style-type: none"> Wide dispersive indoor use of reactive substances in open systems (ERC8b) Wide dispersive outdoor use of substances in closed systems (ERC9b)
List of the names of the worker scenarios (2) and corresponding process categories (PROC)	1. Hand-mixing with intimate contact and only personal protective equipment (PPE) available (PROC19)
Section 2	Operating conditions and risk management measures
Section 2.1	Control of worker exposure
Product characteristics	
Physical state of the product	Liquid, vapour pressure 214 Pa (for the diluted electrolyte solution, considering the solution with lower concentration)
Molecular weight	98.08
Substance concentration in the product	From 25% to 40%
Amounts used	The exposure is considered negligible, thanks to specialised systems.
Frequency and duration	8 hours/day for 220 days/year
Other information relating to duration, frequency and amount of use	Sporadic contacts may occur – Since the batteries are closed systems with long expected service times, maintenance is rather rare. Activities are rarely performed for 8 hours/day, however, the worst case was considered.
Respiratory volume under the conditions of use	10 m ³ /day (standard value for 8 working hours per day)
Skin contact surface with the substance under conditions of use	480 cm ² (standard value ECETOC). Please note that given the corrosive nature of the sulphuric acid, the dermal exposure is not deemed significant for the risk characterisation, as it must be prevented in any case.
Environment volume and ventilation speed	n/a (the loading and unloading of the sulphuric acid from the containers for battery maintenance normally takes place outdoors)
Scenarios	Risk management measures
Containment measures and good practice required Local extraction not required	n/a (the loading and unloading of the sulphuric acid from the containers for battery maintenance normally takes place outdoors)
Personal protective equipment (PPE)	Operators wear a helmet, gloves and anti-acid boots, PPE for the face and eyes and protective overalls. The batteries are generally serviced by trained plant technicians, according to procedures implemented for exposure containment and waste treatment.
Other risk management measures for workers	An emergency shower is required near the loading and unloading stations, to be used in case of accidental releases.
Section 2.2	Environmental exposure control
Molecular weight	98.08
Product characteristics	Vapour pressure 0.1 hPa at 20°C
Water solubility	Miscible
N-octanol/water partition coefficient	-1 (logKow)

Koc	1
Bio-degradation	Non-biodegradable (inorganic acids cannot be considered biodegradable)
Quantities used	n/a
Frequency and duration	365 days per year
Discharge volume of the wastewater treatment plant	2000 m ³ /day (standard values EUSES for local STP)
Flow available of the receiving water body to which the site's wastewater is sent	20,000 m ³ /day (Standard ERC value of flow rate that allows for a dilution of 10 times in the receiving water body)
Amount of substance in wastewater deriving from uses identified in this scenario	342 kg/day (value based on the worst case identified for emission in water)
Amount of substance in waste deriving from the articles	n/a
Type of waste (suitable codes)	Adequate EWC codes
Type of external treatment for the recycle or recovery of the substance	None – The sulphuric acid in water treatment plants dissociates into its constituent, non-hazardous, ions.
Type of external treatment for the final disposal of waste	Incineration or landfill.
Fraction of the substance released in the air during waste handling	n/a
Fraction of the substance released in wastewater during waste handling	n/a
Fraction of substance disposed of as secondary waste	n/a

Section 3 Exposure Estimate

3.1. Health

First level assessment (Tier 1): the exposure assessment by inhalation was carried out using the ECETOC TRA model

Input parameters for the model

	Parameter
Molecular weight	98.08 g/mol
Vapour pressure	214 Pa (for the diluted electrolyte solution, considering the solution with lower concentration)
Physical state of the product	Liquid
Dustiness	n/a
Activity duration	>4 hours
Ventilation	Indoor environments with local aspiration (LEV)

The estimate of the exposure with ECETOC was refined through a second level assessment by inhalation (Tier 2) carried out using the ART model, obtaining more realistic results.

Input parameters for the ART model

	PROC	Parameter
Exposure duration	19	240 minutes of exposure – 240 minutes of non-exposure
Type of product	19	Liquid (low viscosity – like water)
Process temperature	19	Environmental temperature (15-25°C)
Vapour pressure	19	The substance is considered little volatile, exposure to mists is considered
Liquid fraction weight	19	0.25

Localisation of the primary emission source	19	The primary emission source is localised in the worker's breathing area (within 1 metre)
Activity class	19	Handling of contaminated objects
Containment	19	n.a.
Localised control systems	19	None
Segregation	19	n.a.
Fugitive emission sources	19	Not completely closed – good effective practices implemented
Dispersion	19	Inside, any environment dimension, good natural ventilation

The estimated acute and chronic inhalation exposures are for all process categories below their DNEL

3.2. Environment

First level assessment (Tier 1): it was carried out using the EUSES model and by entering the standard input data and ERC. It was not necessary to carry out the second level assessment.

Input parameters for the EUSES model.

Input parameters	Value	Unit	Standard ERC (if applicable)
Molecular weight	98.08	g/mol	
Vapour pressure at 20°C	0.1	hPa	
Water solubility	Miscible	Mg/ml	
Partition coefficient: n-octanol/water	-1	LogKow	
Koc	1		
Bio-degradation	Non-biodegradable		
Life cycle phase	Widely distributed use in the territory		
Environmental release class	ERC8b, ERC9b		
Fraction of regional tonnage (Tier 1)			1
STP			Yes
Emission events per year	365 (considering that maintenance is carried out for most days in some site within the concerned region)	days	365
Release in air (standard value)	ERC8b: 0.1 ERC9b: 5	%	ERC8b: 0.1 ERC9b: 5
Release in water (standard value)	ERC8b: 2 ERC9b: 5	%	ERC8b: 2 ERC9b: 5
Dilution factor applied for the derivation of PEC			25*10 ⁹ m ³ /year (large-scale distribution)
Tonnage	2,500	t/year	Estimate of use in single sites

Risk containment measures and values measured used in the second level assessment (Tier 2)
 (Not applicable: 2nd level assessment not required)

The concentration estimated for all environmental compartments is below the respective PNEC

Section 4

Guide for assessing if working within the limits established by the scenario

4.1. Health

It is provided that exposures do not exceed acute and chronic inhalers DNEL for local effects when the Operating Conditions/Risk Management Measures illustrated in Section 3 are applied.

Where different Operating Conditions/Risk Management Measures are adopted, the users must ensure that the risks are managed at least at an equivalent level.



Electrolyte – Sulphuric acid

FIAMM Energy Technology S.p.A.
Safety Data Sheet according to
REACH Regulation
03/11/2022 - Revision n. 4
Pagina n. 18/20

4.2. Environment

It is provided that exposures do not exceed the PNEC when the Operating Conditions/Risk Management Measures illustrated in Section 3 are applied.

Where different Operating Conditions/Risk Management Measures are adopted, the users must ensure that the risks are managed at least at an equivalent level.

2 Exposure scenario (2 of 2)	
Use of batteries containing sulphuric acid	
Usage descriptors related to the life cycle phase	SU21 Consumer uses: households (= population in general = consumers) AC3 Electric batteries and accumulators No process – PROC 19 is adopted as worst case ERC9b
Description of the environmental scenario (1) and category of release in the corresponding environment (ERC)	Wide dispersive outdoor use of substances in closed systems (ERC9b)
List of the names of the worker scenarios (2) and corresponding process categories (PROC)	Hand-mixing with intimate contact and only personal protective equipment (PPE) available (PROC19)
Section 2	Operating conditions and risk management measures
Section 2.1	Control of worker exposure
Product characteristics	
Physical state of the product	Liquid, vapour pressure 214 Pa (for the diluted electrolyte solution)
Molecular weight	98.08
Substance concentration in the product	From 25% to 40%
Amounts used	n/a – activity carried out very sporadically by the consumer
Frequency and duration	8 hours/day for 220 days/year
Other operating conditions that affect worker exposure	Sporadic contacts may occur – The batteries are closed systems with long expected service times, therefore, maintenance is rather rare
Respiratory volume under the conditions of use	10 m ³ /day (standard value for 8 working hours per day)
Skin contact surface with the substance under conditions of use	480 cm ² (standard value ECETOC). Please note that given the corrosive nature of the sulphuric acid, the dermal exposure is not deemed significant for the risk characterisation, as it must be prevented in any case.
Environment volume and ventilation speed	n/a (activities are generally carried out outdoors)
Scenarios	Risk management measures
Containment measures and good practice required Local extraction not required	Activity is generally carried out outdoors. Consumers are advised to wear protective clothing. However, the worst assumption is that localised checks are not adopted.
Personal protective equipment (PPE)	Activity is generally carried out outdoors. Consumers are advised to wear protective clothing. However, the worst assumption is that localised checks are not adopted.
Other risk management measures for workers	No other measure is required.
Section 2.2	Environmental exposure control
Molecular weight	98.08
Product characteristics	Vapour pressure 0.1 hPa at 20°C
Water solubility	Miscible
Partition coefficient: n-octanol/water	-1 (logKow)
Koc	1
Bio-degradation	Non-biodegradable (inorganic acids cannot be considered biodegradable)
Quantities used	n/a
Frequency and duration	365 days per year

Discharge volume of the wastewater treatment plant	2000 m ³ /day (standard values EUSES for local STP)
Flow available of the receiving water body to which the site's wastewater is sent	20,000 m ³ /day (Standard ERC value of flow rate that allows for a dilution of 10 times in the receiving water body)
Amount of substance in wastewater deriving from uses identified in this scenario	34.2 kg/day value based on the worst case identified
Amount of substance in waste deriving from the articles	n/a
Type of waste (suitable codes)	Adequate codes taken from the European list of waste
Type of external treatment for the recycle or recovery of the substance	None
Type of external treatment for the final disposal of waste	Dissociation in constituent ions (non-hazardous) in a wastewater treatment plant.
Fraction of the substance released in the air during waste handling	n/a
Fraction of the substance released in wastewater during waste handling	n/a
Fraction of substance disposed of as secondary waste	n/a

Section 3 Exposure Estimate

3.1. Health

First level assessment (Tier 1): the exposure assessment by inhalation was carried out using the ECETOC TRA model
 Input parameters for the model

	Parameter
Molecular weight	98.08 g/mol
Vapour pressure	214 Pa (for the diluted electrolyte solution, considering the solution with lower concentration)
Physical state of the product	Liquid
Dustiness	n/a
Activity duration	From 15 minutes to 1 hour
Ventilation	Indoor environments without local aspiration (LEV)

The estimate of the exposure with ECETOC was refined through a second level assessment by inhalation (Tier 2) carried out using the ART model, obtaining more realistic results.

Input parameters for the ART model

	PROC	Parameter
Exposure duration	19	240 minutes of exposure – 240 minutes of non-exposure
Type of product	19	Liquid (low viscosity – like water)
Process temperature	19	Environmental temperature (15-25°C)
Vapour pressure	19	6 Pa - The substance is considered little volatile, exposure to mists is considered
Liquid fraction weight	19	0.25
Localisation of the primary emission source	19	The primary emission source is localised in the worker's breathing area (within 1 metre)
Activity class	19	Handling of contaminated objects
Localised control systems	All	None
Fugitive emission sources	All	Not completely closed – good effective practices implemented
Dispersion	All	Inside, any environment dimension, good natural ventilation



Electrolyte – Sulphuric acid

FIAMM Energy Technology S.p.A.
Safety Data Sheet according to
REACH Regulation
03/11/2022 - Revision n. 4
Pagina n. 20/20

The estimated acute and chronic inhalation exposures are for all process categories below their DNEL

3.2. Environment

First level assessment (Tier 1): it was carried out using the EUSES model and by entering the standard input data and ERC.

Input parameters for the EUSES model.

Input parameters	Value	Unit	Standard ERC (if applicable)
Molecular weight	98.08	g/mol	
Vapour pressure at 20°C	0.1	hPa	
Water solubility	Miscible	Mg/ml	
Partition coefficient: n-octanol/water	-1	LogKow	
Koc	1		
Bio-degradation	Non-biodegradable		
Life cycle phase	Widely distributed use		
Environmental release class	ERC9b		
Fraction of regional tonnage (Tier 1)			1
STP			Yes
Emission events per year	365 (it is considered probable that the activity is carried out in some site in the region on most days, due to the small but highly distributed scale of this use)	days	365
Release in air (standard value)	5	%	5
Release in water (standard value)	5	%	5
Dilution factor applied for the derivation of PEC			25 * 10(9) m ³ /year
Tonnage	2,500	t/year	Estimate of use in single sites

Second level assessment not carried out (Tier 2)

The concentration estimated for all environmental compartments is below the respective PNEC

Section 4 Guide for assessing if working within the limits established by the scenario

4.1. Health

It is provided that exposures do not exceed acute and chronic inhalers DNEL for local effects when the Operating Conditions/Risk Management Measures illustrated in Section 3 are applied.

Where different Operating Conditions/Risk Management Measures are adopted, the users must ensure that the risks are managed at least at an equivalent level.

4.2. Environment

It is provided that exposures do not exceed the PNEC when the Operating Conditions/Risk Management Measures illustrated in Section 3 are applied.

Where different Operating Conditions/Risk Management Measures are adopted, the users must ensure that the risks are managed at least at an equivalent level.